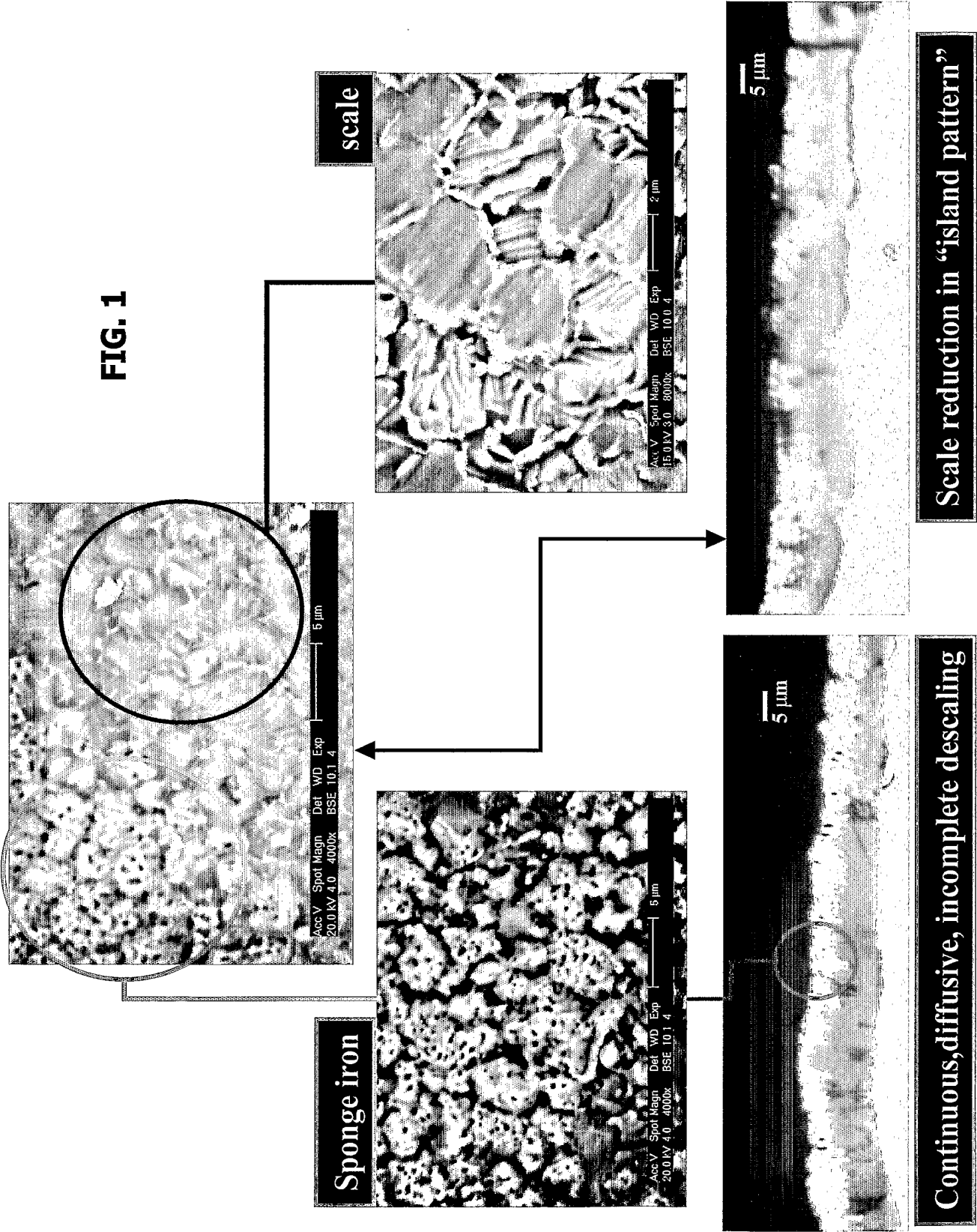


FIG. 1



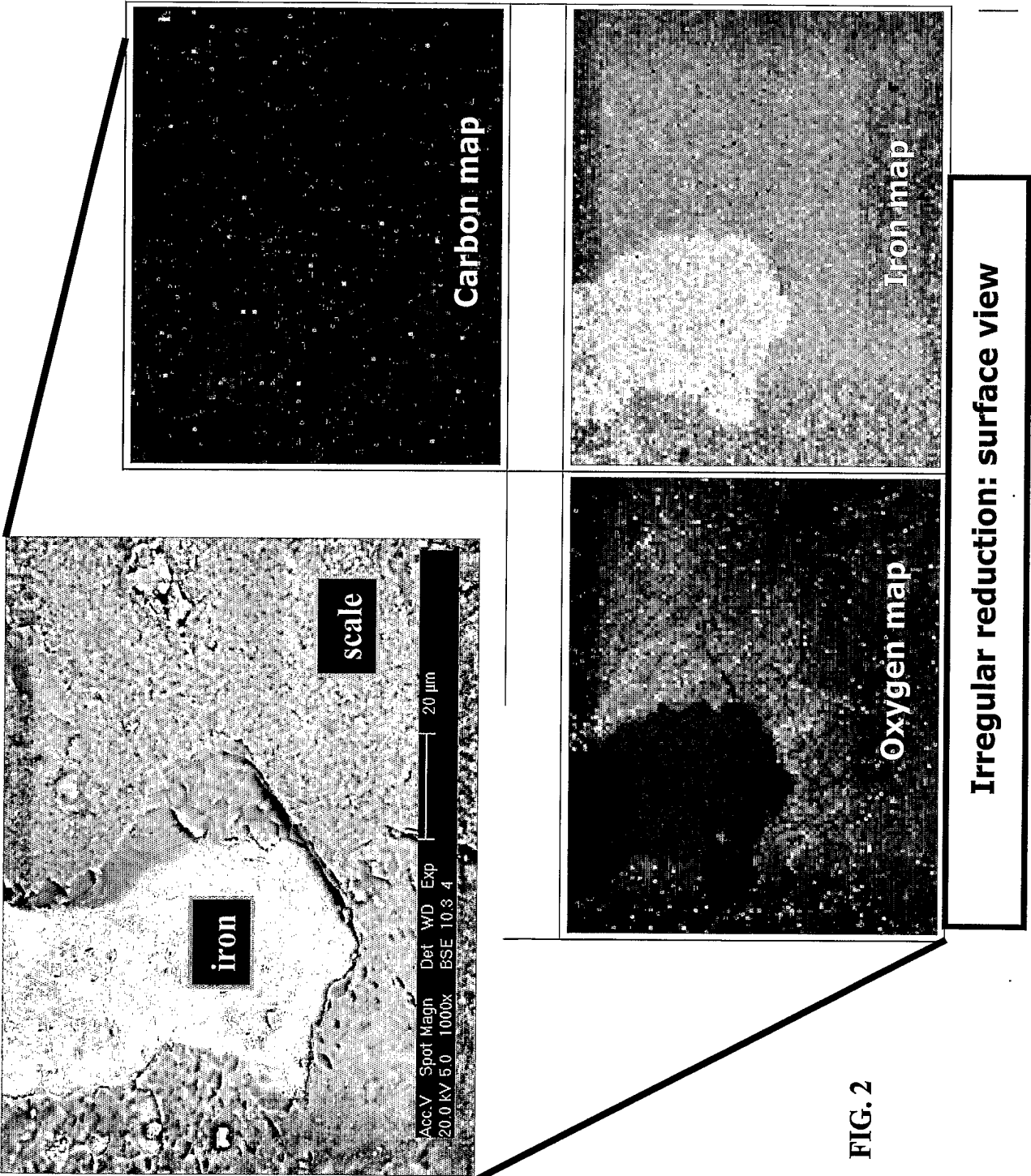
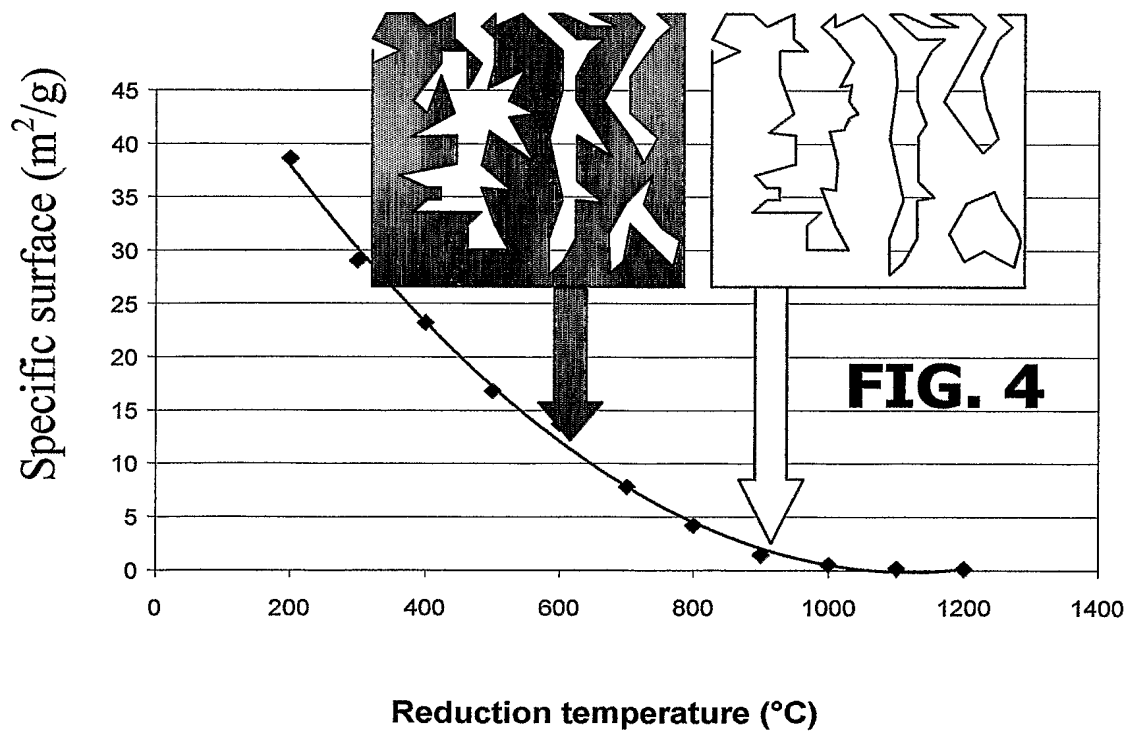
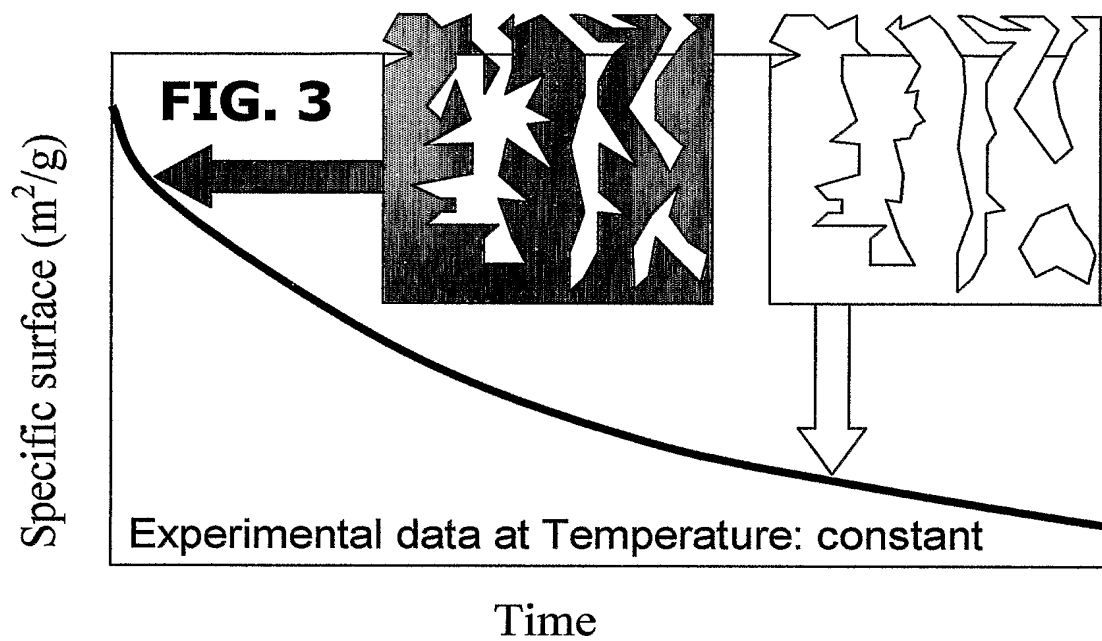


FIG. 2

3/20



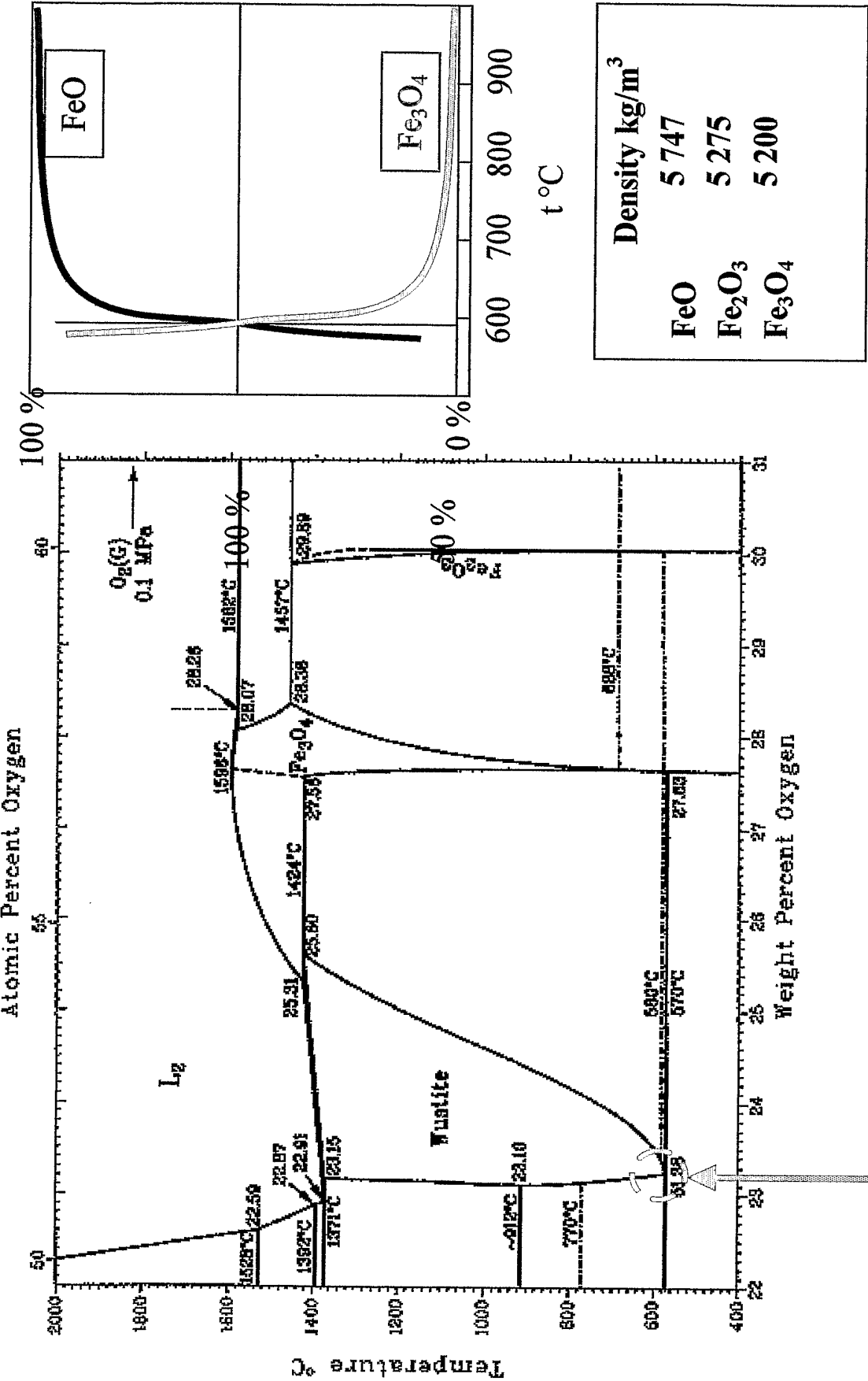
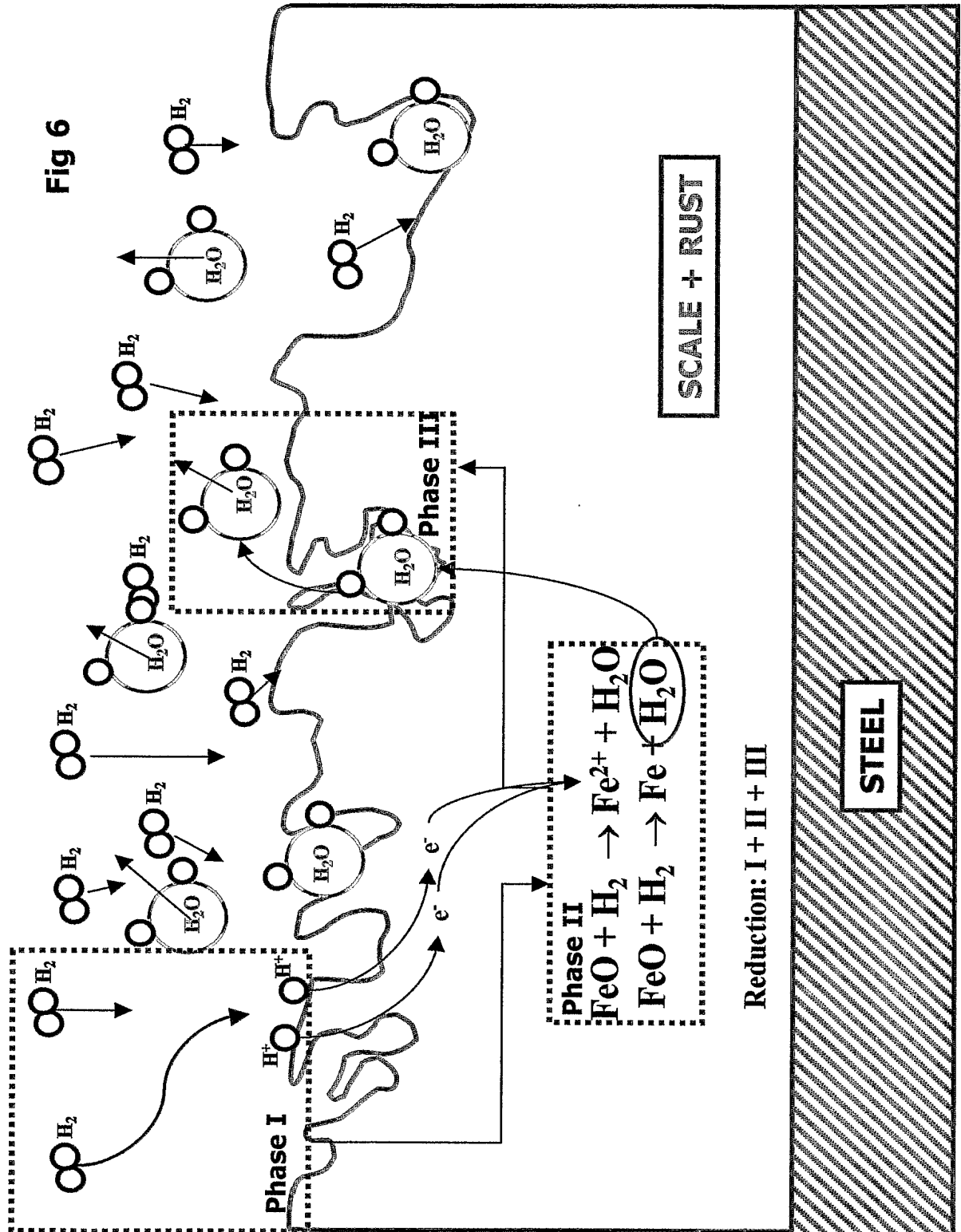


FIG. 5



6/20

Fig 7

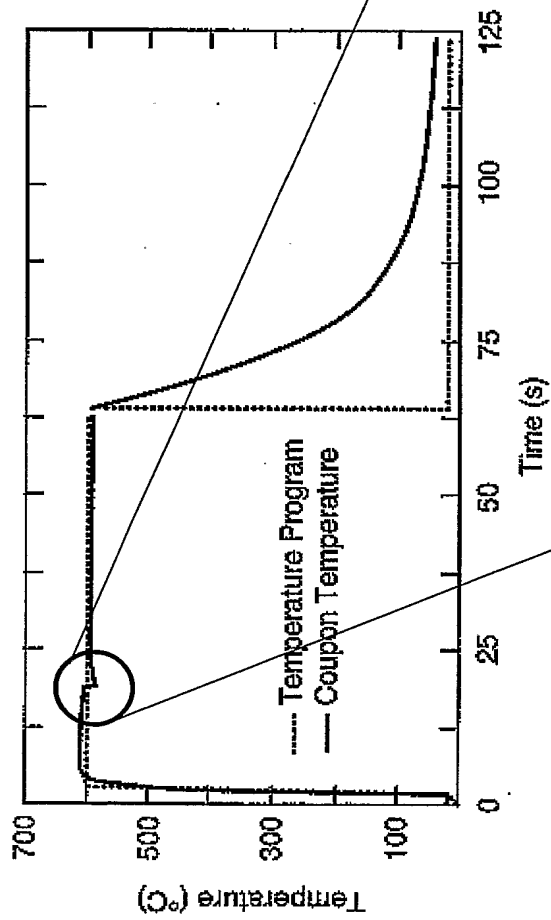
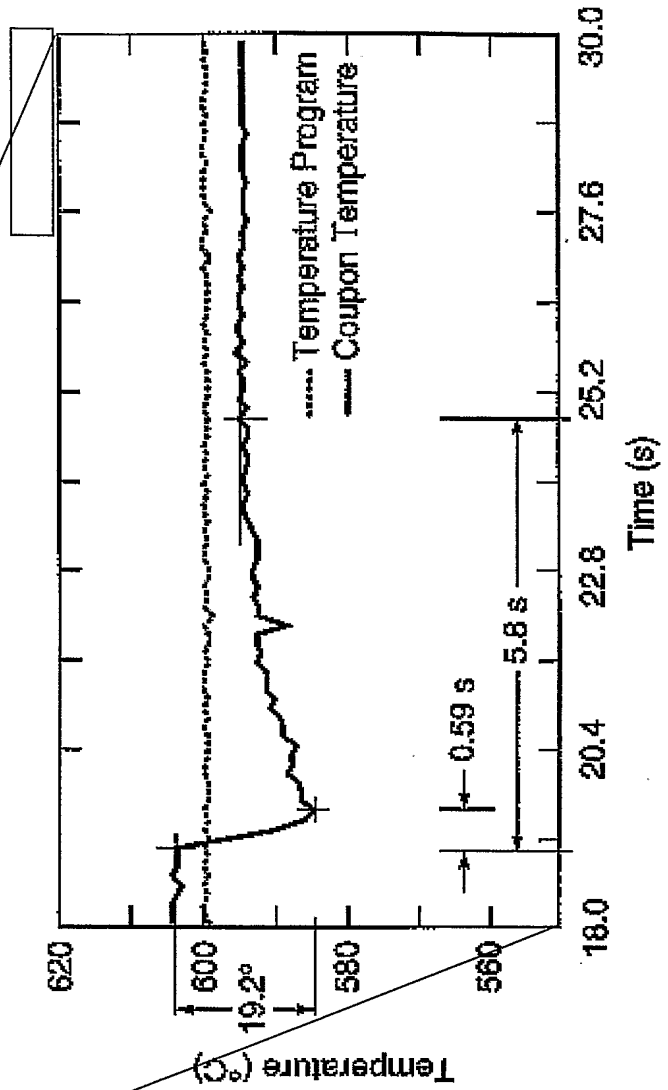
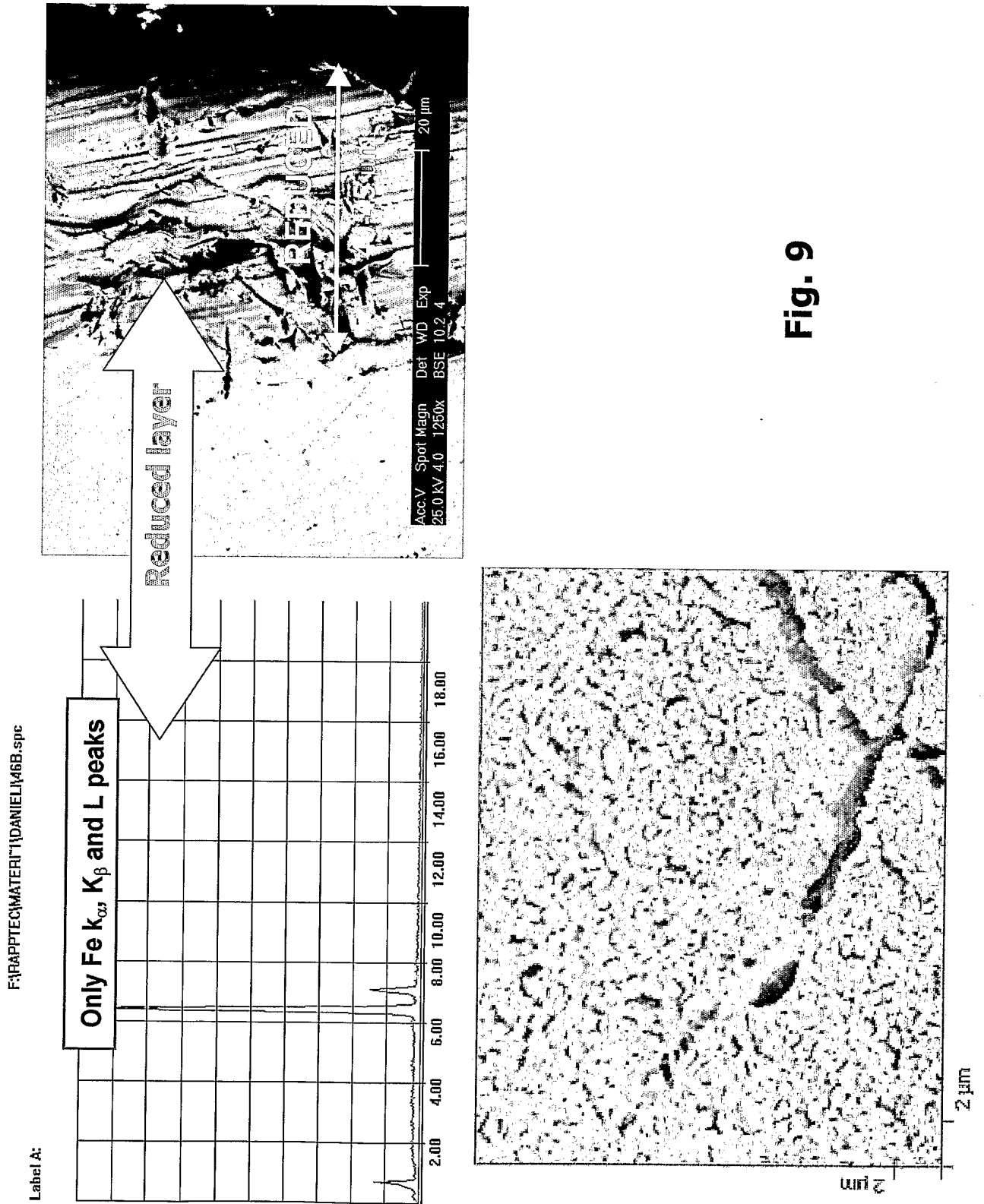


Fig 8





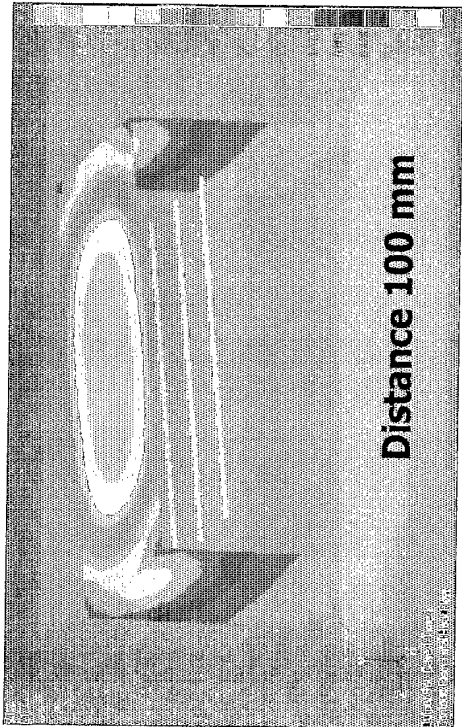
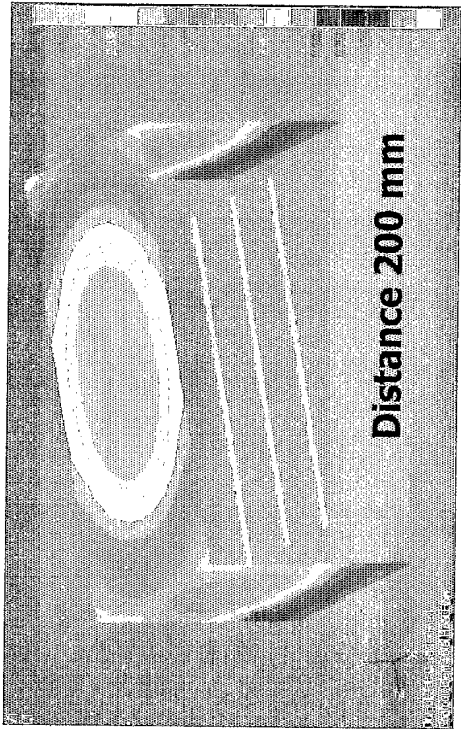
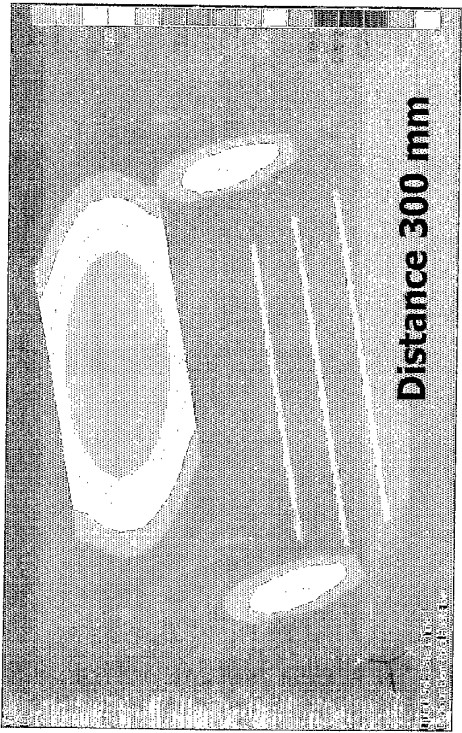
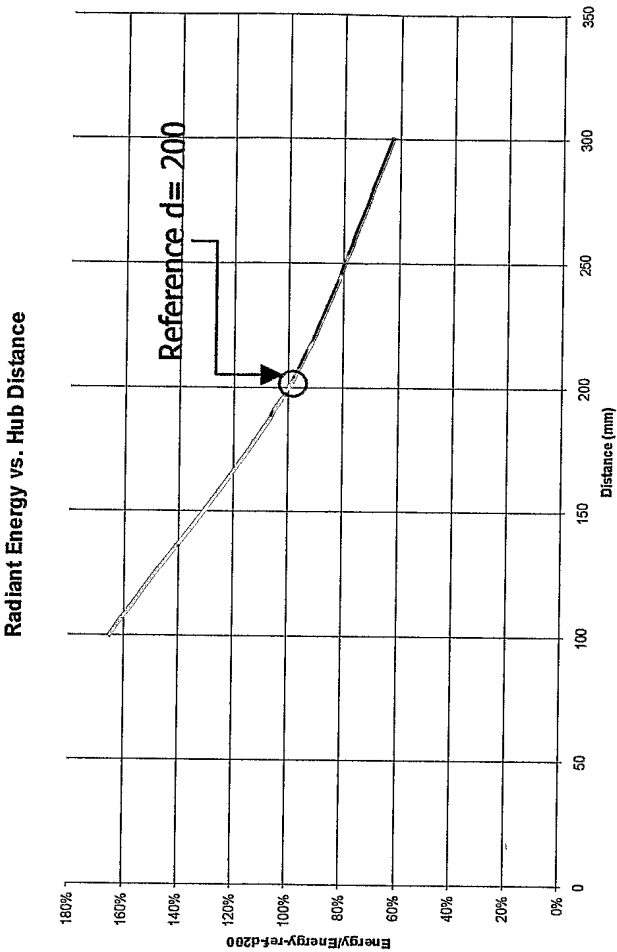
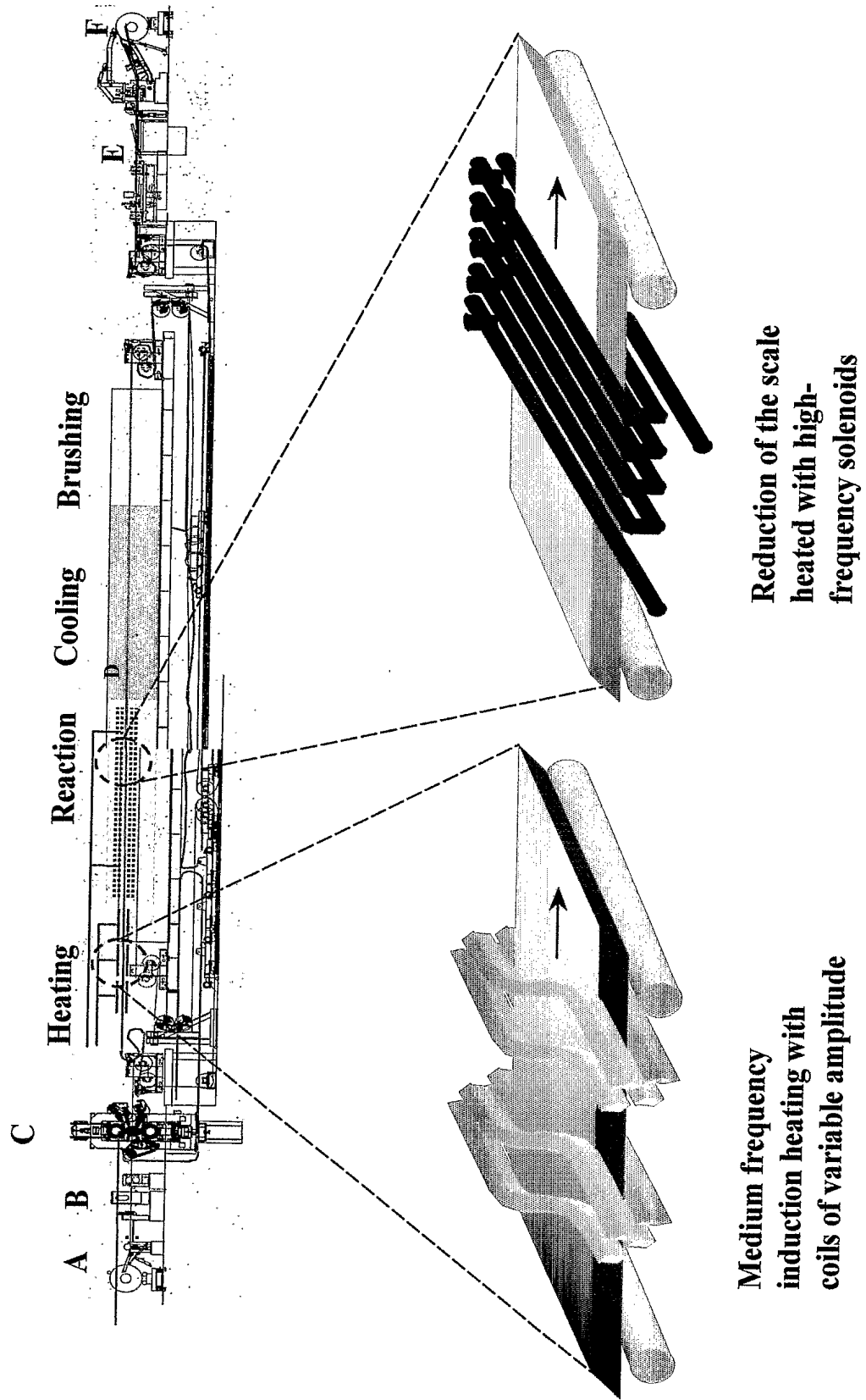


FIG. 10

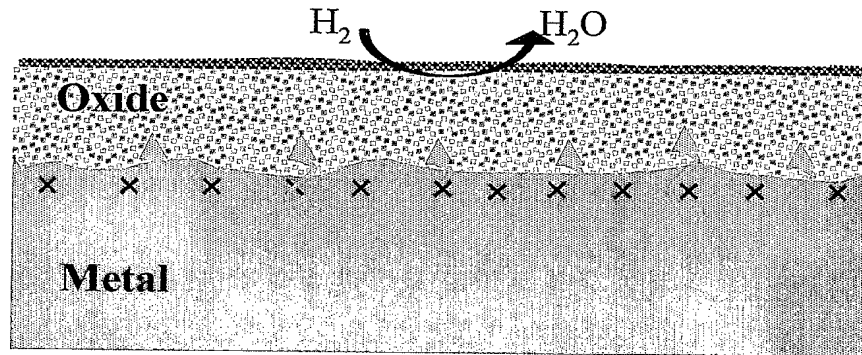


9/20

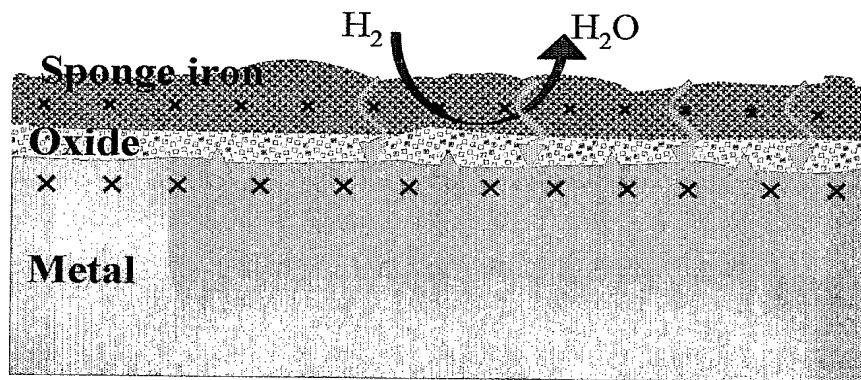
FIG. 11



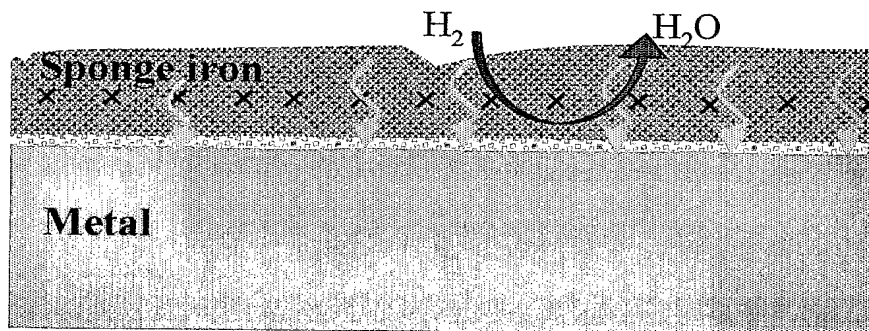
10/20

Fig. 12

STEP I : reduction of the outer oxide layer with heating from the metal



STEP II: reduction of the oxide with heating from the metal and from the sponge iron



STEP III: final reduction of the oxide with heating from the sponge iron

 Thermal flow
 x x Current lines

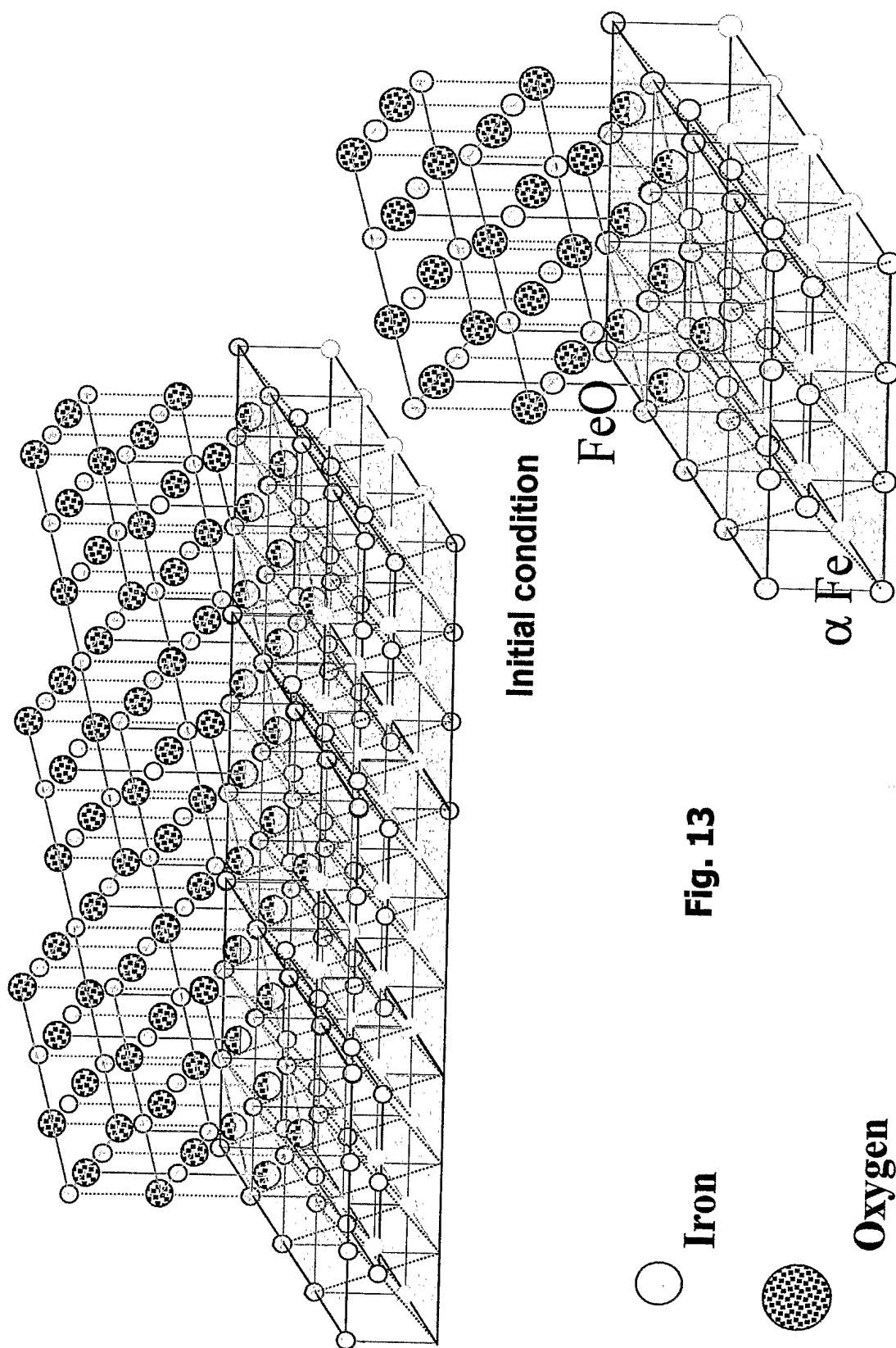


Fig. 13

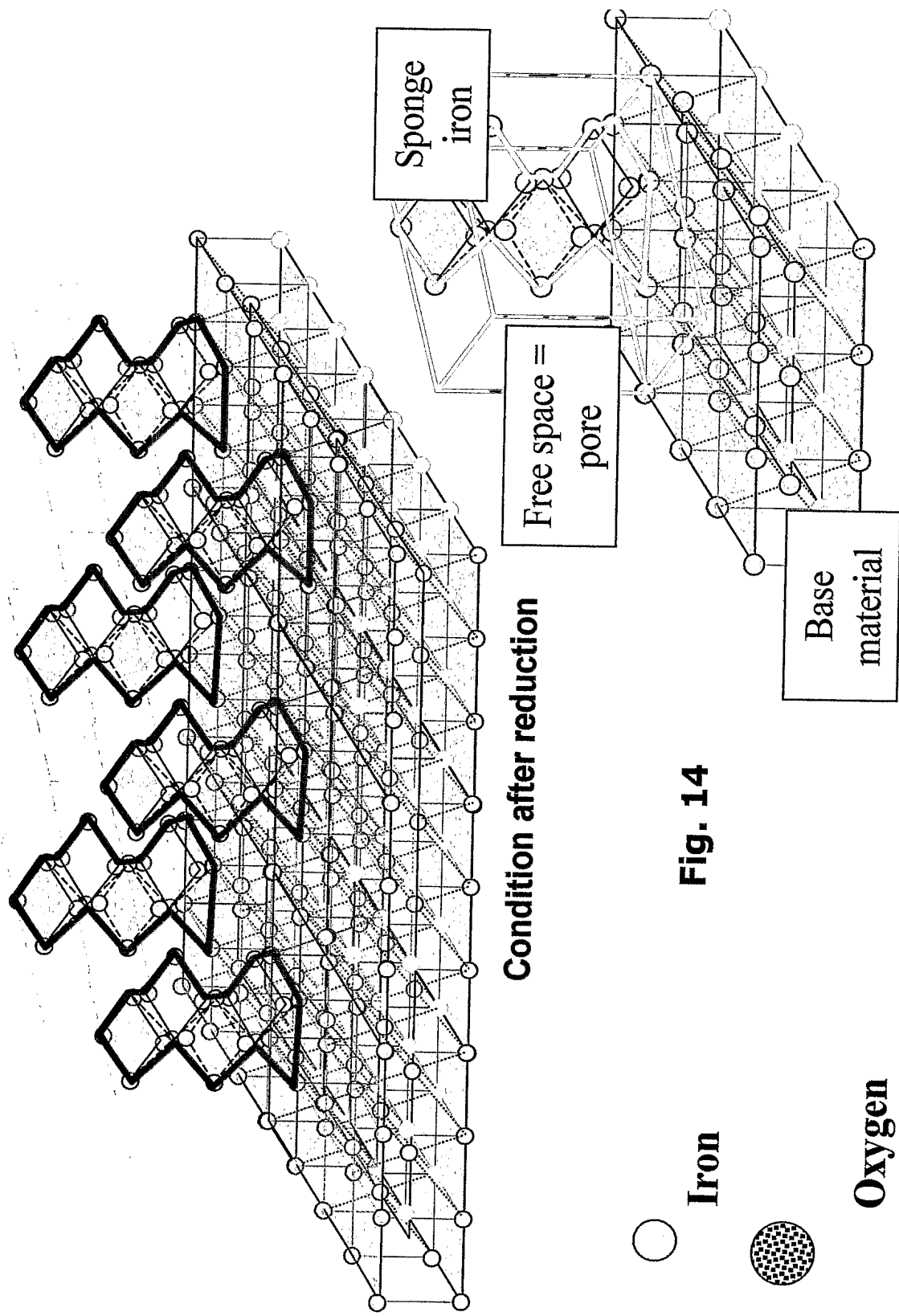


Fig. 14

13/20

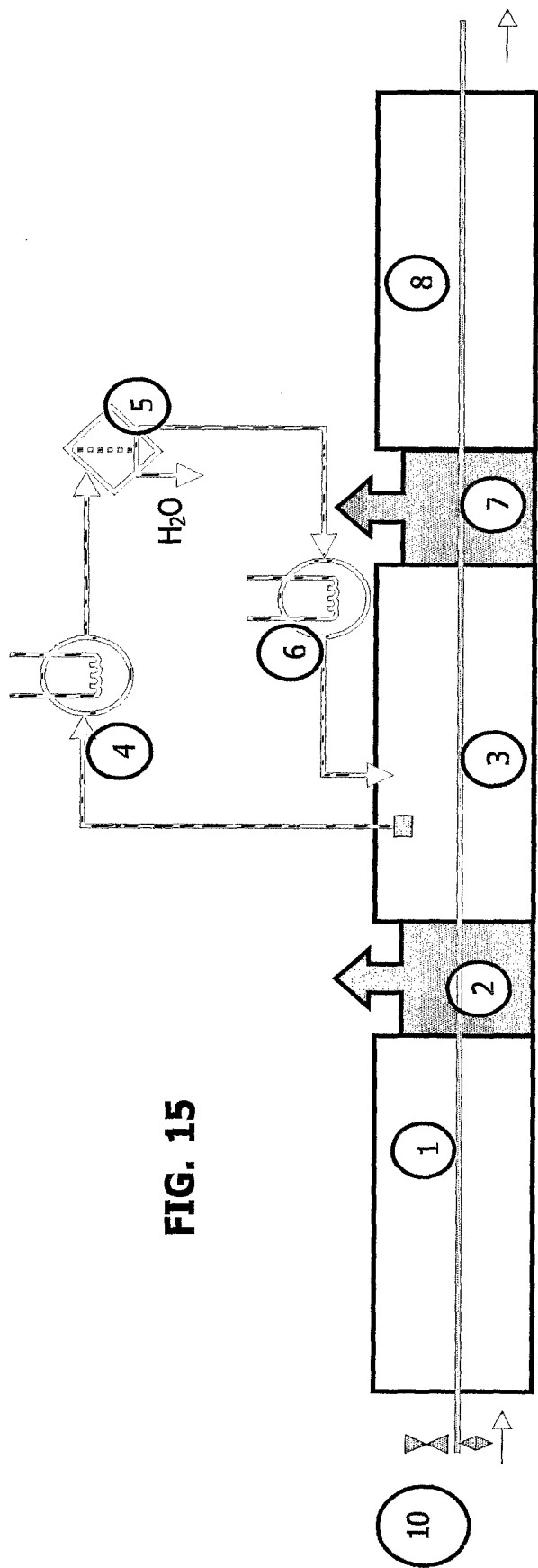


FIG. 15

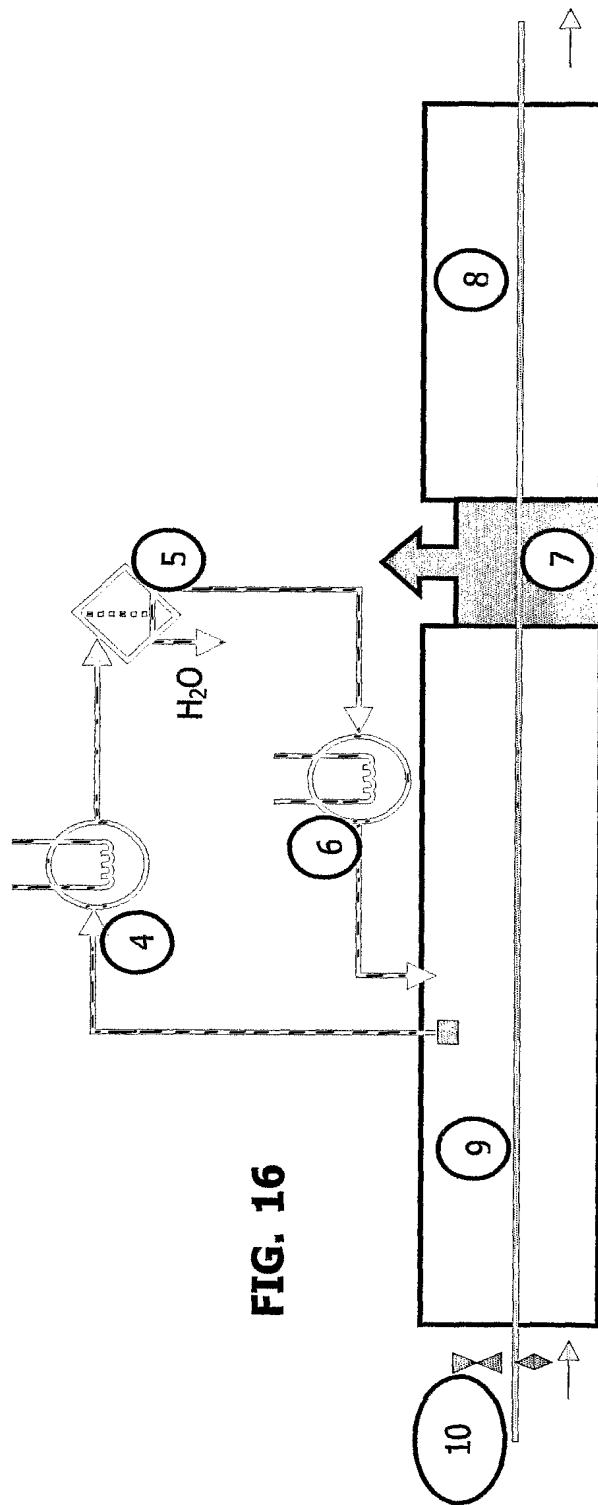


FIG. 16

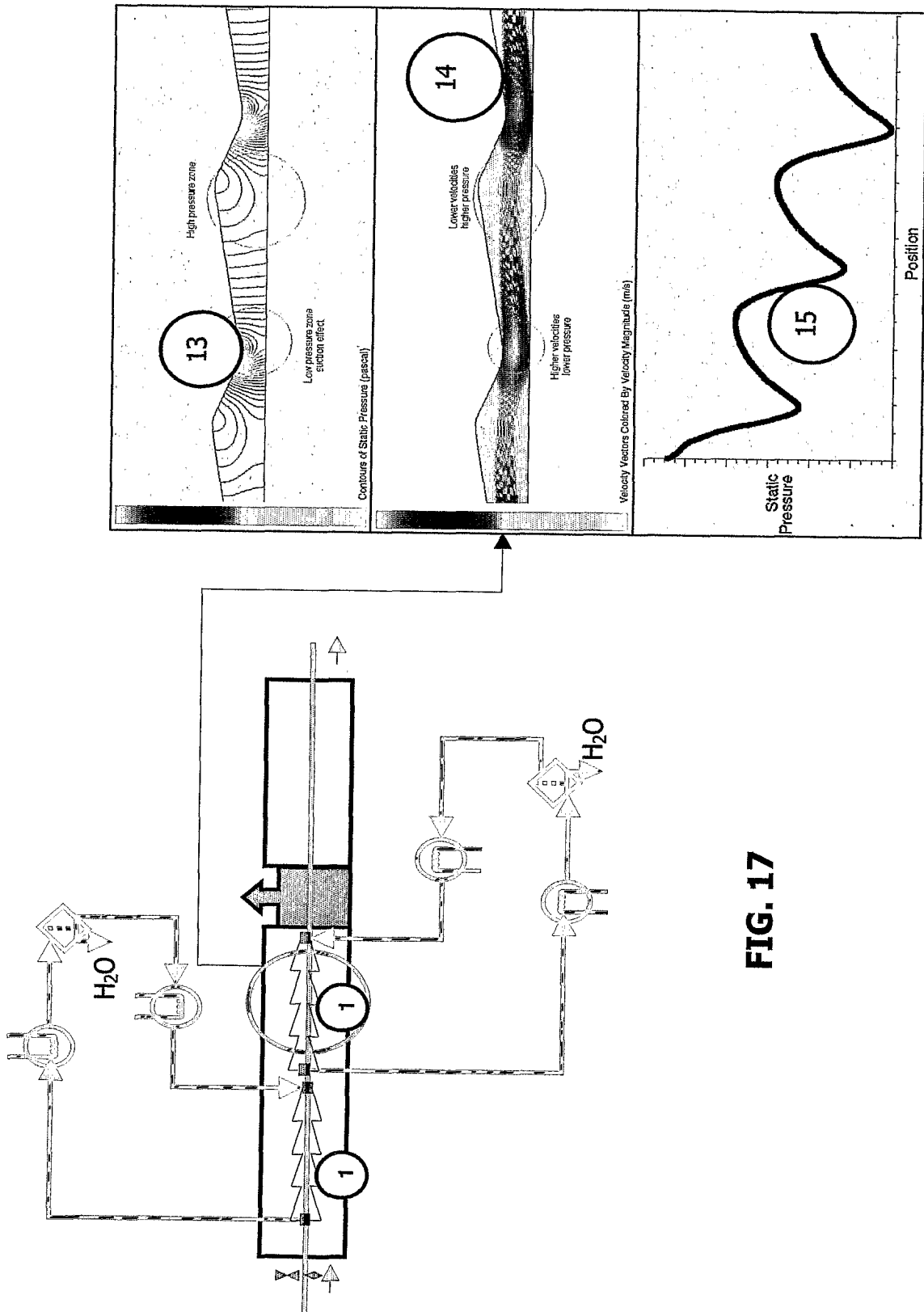
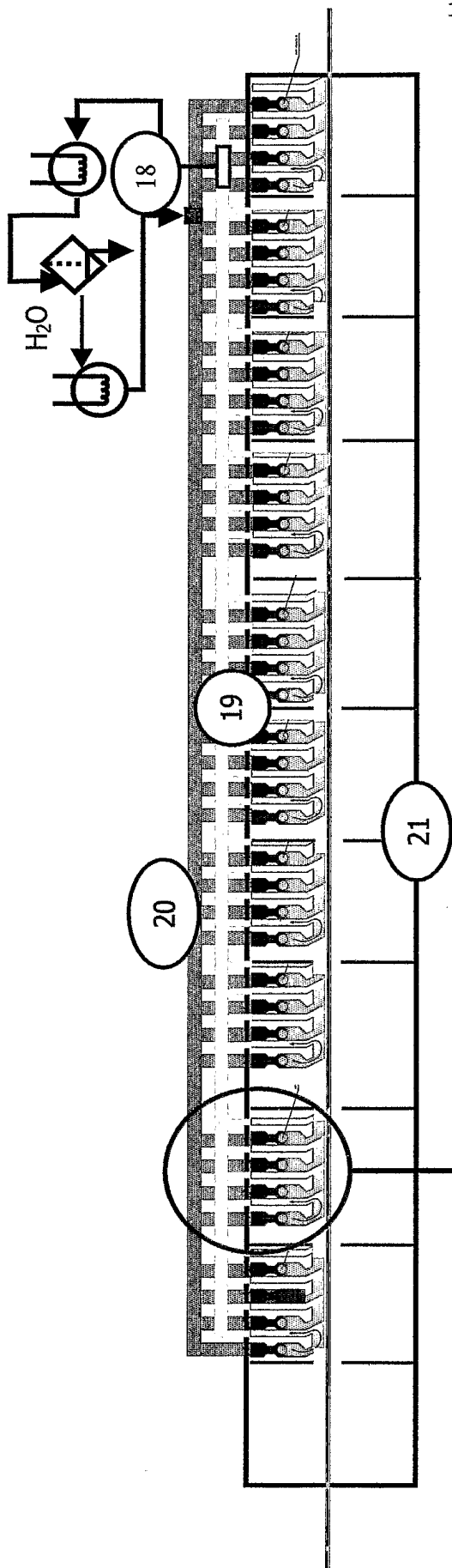


FIG. 17

15/20



Convection as a main heat transfer mechanisms

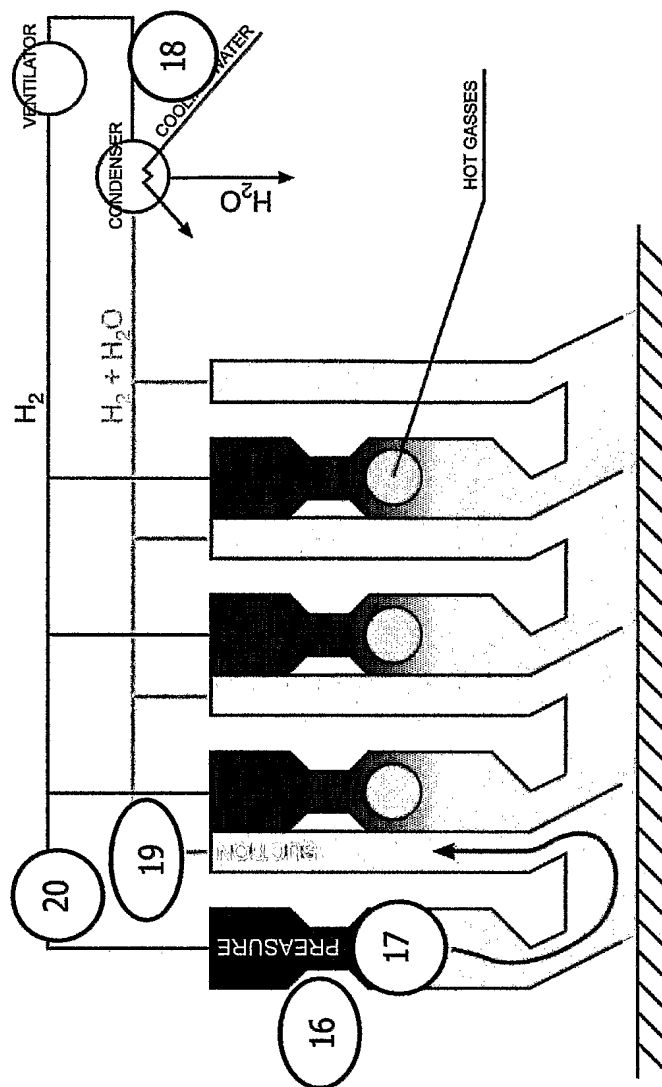


FIG. 18

16/20

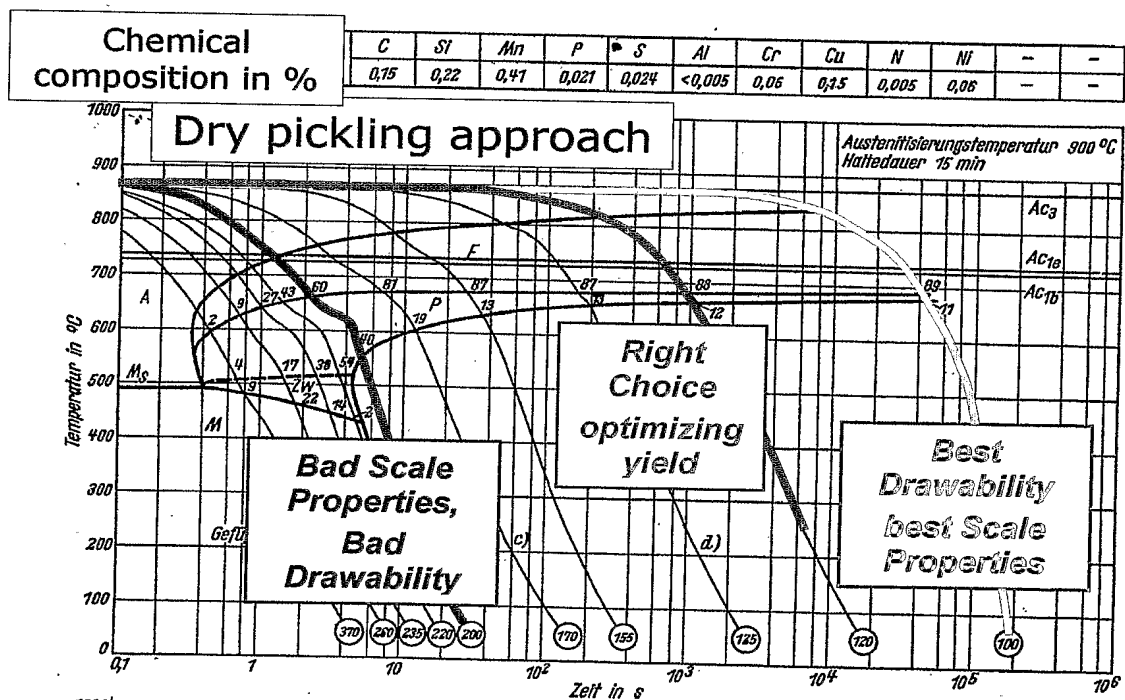
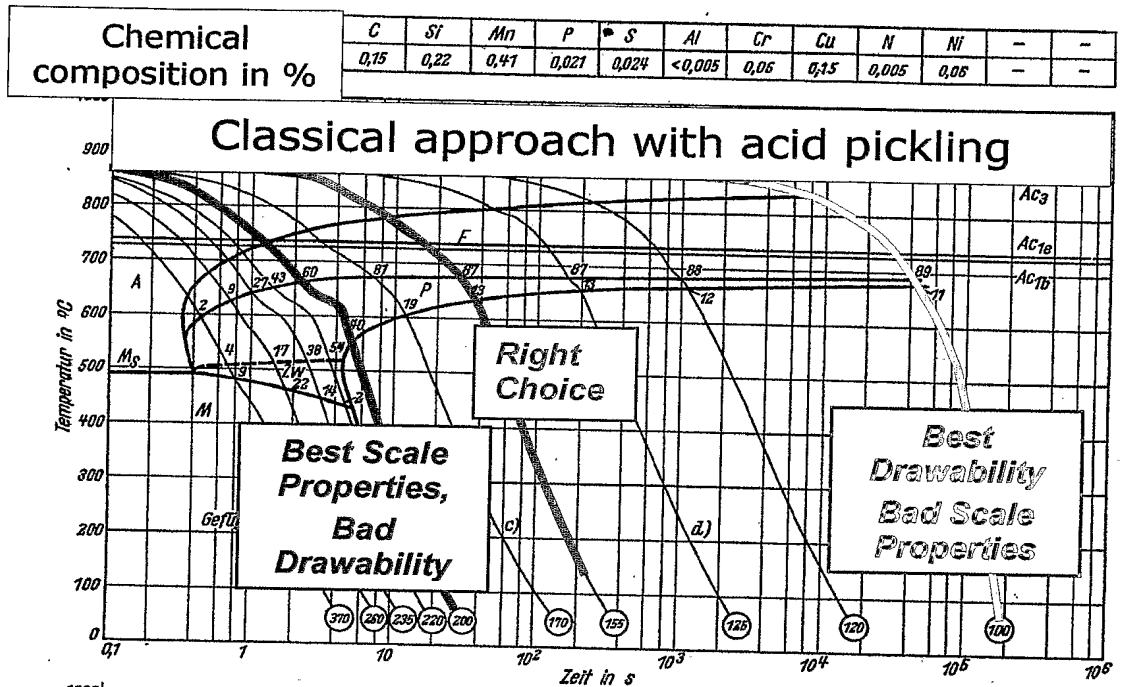
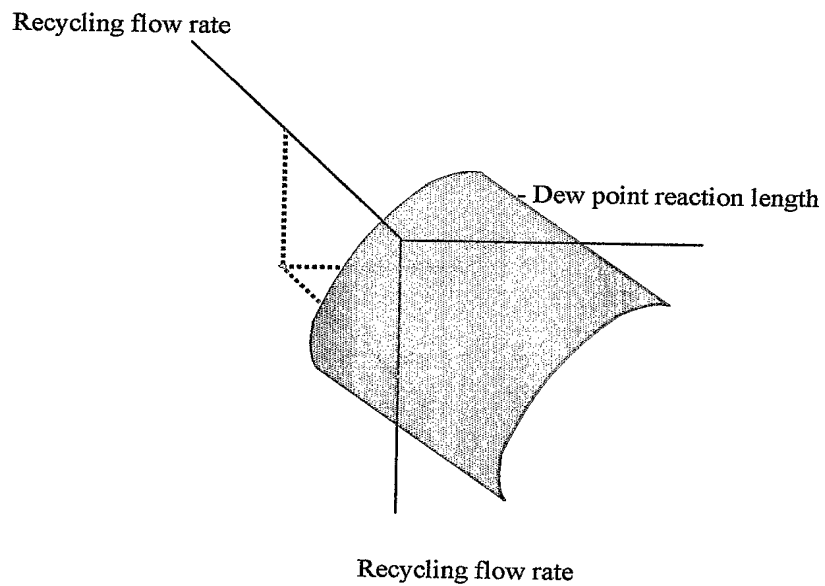


FIG. 19

17/20

FIG. 20

Recycling flow rate with fixed dew point

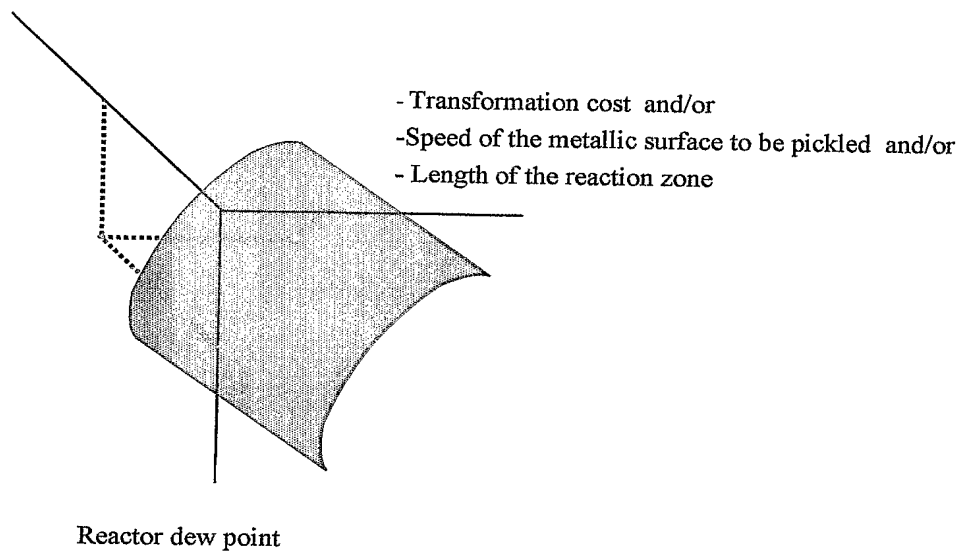
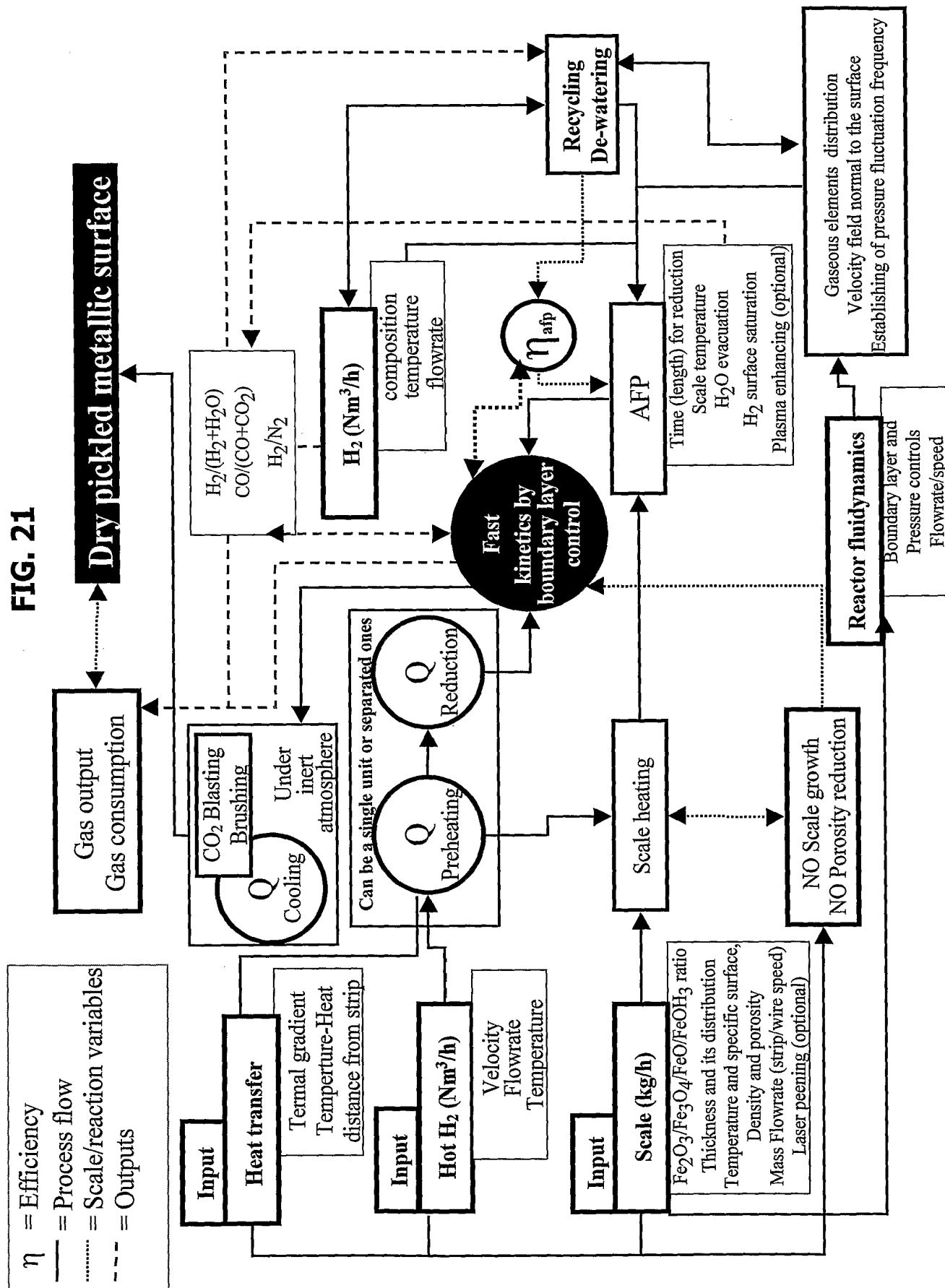


FIG. 21



19/20

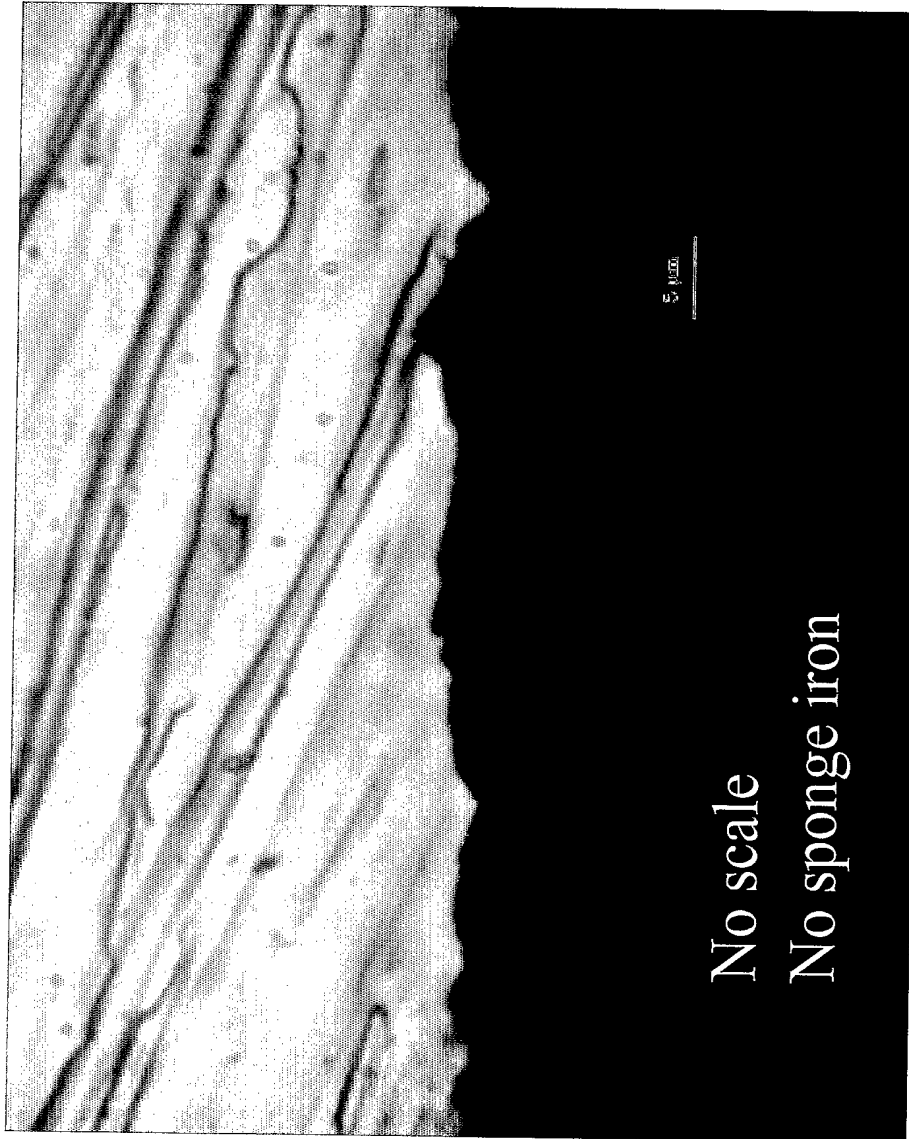


Fig. 22

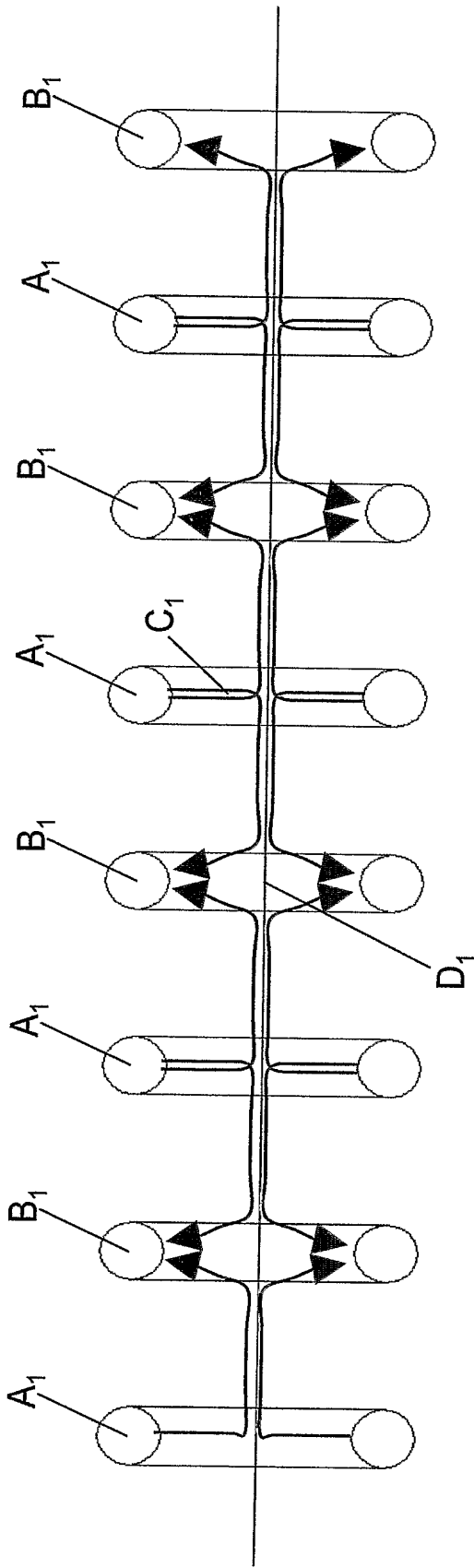


FIG. 23